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241 do while the crops are growing, and therefore has sufficient justification in native eyes. To utilize it as a kind of green manure is, under purely native conditions, hardly feasible, since there is no means of digging it into the soil; and to leave a tangle of leaves and twigs on the surface would serve rather to obstruct the gardener than to benefit the garden.

The only real fertilizer which the native might be expected to use under the present system, viz. a lax culture of wide areas, is the ash from the burnt debris of clearing. As far as I am aware, however, he has no genuine conception of the value of ash as a manure, though one thoroughly typical instance came to my notice in which the ash had got into the place of a fertilizer under false pretences. Of the many varieties of taro, distinguishable by the colour or form of their stalks, leaves, &c., there is one named *Punduga* whose stem is almost black. In Koropata, while, as elsewhere, there was a tendency to sweep the ashes together to keep them out of the way, it was the custom to plant the black-stalked *Punduga* right in the black heap of ashes, because of the affinity which would be so obvious to a native. This practice, my informant said, was attended with good results: if that particular black-stemmed taro were not planted on the ashes it would not do so well. There are many other magical fertilizers which will be referred to later on: this is simply a case of magic stumbling upon the truth.

241 312 (*b*) *Draining, Irrigation, &c.* Considering the almost level gradient at which the plain slopes down to the sea and the general absence of contours, the drainage is far better than might be expected. Furthermore, there is, as a rule, such a superfluity of land that the native has simply to avoid the over-wet localities. He is never called upon to drain his swamps. On the lower reaches of the rivers, however—particularly the Mambare—there is less available land and, owing to the flatness, draining would be more difficult. Nevertheless I do not know that garden-

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ing is hampered to any extent in these localities. Owing to natural drainage the flood-waters subside quietly and fairly rapidly, and, as I have said before, the flood as a rule does little harm and is not regarded very seriously by the natives.

It has been pointed out to me that one of the principal difficulties in the drainage of the plains is the tendency for smaller streams to pile up a mass of drift-wood, so as eventually to block their own progress. In the majority of cases this drift-wood seems to have been brought down by floods, but it may be that the case is rendered worse by the natives' habit of throwing felled timber into a convenient river instead of firing it. At any rate the effect is sometimes to cause local inundations, to deflect streams, and to create sour stagnant back-waters.

The native knows well enough the principle of draining, though he has no need to use it for horticulture. In the creek fishing of the inland peoples draining is constantly practised in order to make the water shallow enough for the use of 'New Guinea Dynamite' and scoop-nets. The water is commonly bailed out with sago-branch scoops, but one may also see long gutters (*andere*), elaborate undertakings when we consider that the implements for their construction are a spatulate stick and a knife.

The small engineering feats of the fisherman might be adapted to irrigation as well as drainage, though, I believe, the idea has never suggested itself to the Orokaiva. He knows how to build a rudimentary dam and how to construct a race, but the latter is a loop rejoining the stream and has never been turned into an irrigation channel. The drought, as was observed before, may sometimes be serious, and some simple kind of irrigation would be a blessing to the native at the height of the South-East season. The thought of carrying water is for obvious reasons abhorrent to him; he would rather go hungry. What he actually does is to plant out the *bere* or offsets of his taro in the damp swampy places and so

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241 ensure their survival. In the Wedau country about
312 Bartle Bay irrigation has become a necessity because the strip of cultivable land between the steep grass hills and the coast is of limited area and subject to a yearly dry spell of some severity. The same necessity is not often felt in the Northern Division, though in the foot-hill country, at any rate, the Wedauan methods could have been adopted with advantage.

241 The paucity of good land and the steepness of the hills about Bartle Bay—to continue the comparison—have necessitated another improvement, viz. terracing. There are few localities in the Northern Division where the same conditions prevail. Between the mouths of the Mambare and Opi rivers, however, the coastal belt is a mixture of grass-land, swamp, and hills, and here the gardener is often compelled to assail the steepest acclivities—so steep at times that climbing them is hard enough, to say nothing of cultivating them. In this country, as in the rest of the Division, the heavier timber is allowed for the most part to lie where it falls. But here, whether by intent or not, it serves a purpose. For those trees which fall across the slope or diagonally become paths and standing-places for the gardeners, and as detritus falls and builds up against them, they become virtually terraces. It is true they are not regular and level like those of Bartle Bay, and, as far as I have observed, they are prevented from giving way not by driven stakes, but only by the stumps of the felled trees or by other obstacles on the hill-side. However these points may be only refinements, and it is easy enough to imagine that the idea of terracing might originate independently in the way I have suggested.

244 (*c*) *Planting.* The Orokaiva is no tiller of the soil. He loosens it with a digging-stick in order to plant the taro shoot, and his wife loosens it again when she pulls the taro. Otherwise it is left to look after itself.

Taro is propagated principally by offsets, but also by replanting tops of used tubers. When rain has fallen